A PRELIMINARY FEASIBILITY STUDY

FOR AN

UNDERGROUND GOLD MINING OPERATION

IN CENTRAL NOVA SCOTIA

OFR 603

NOVA SCOTIA DEPARTMENT OF MINES AND ENERGY

ENGINEERING SECTION

NOVEMBER 1984

SUMMARY

The preliminary feasibility study was undertaken to determine if a gold deposit, such as an undisturbed Caribou or Goldenville type, would be viable if discovered today. The study found that:

1) the deposit would be economical, and
2) such a deposit makes a very attractive exploration target.

To date, there are 37 gold deposits in the Province that have each produced more than 1,000 troy ounces of gold. The average tonnage and grade of these deposits are 68,675 tons and 0.453 troy ounces of gold per ton (an average of 31,110 troy ounces/deposit).

Two deposits, the Caribou and the Goldenville, produced over 100,000 ounces. Mill records indicate that the Caribou produced 301,831 tons (some of this tonnage was from Moose River) at an average reported head grade of 0.36 troy ounces/ton for 108,659 troy ounces, and the Goldenville produced 448,428 tons at an average reported head grade of 0.469 troy ounces/ton for 161,434 troy ounces. This report assumes that a deposit found today, employing modern mining methods, would produce higher tonnage at a lower average grade. The base case tonnage and grade used in this feasibility study are 630,000 tons and 0.26 troy ounces/ton gold. It is assumed that the deposit is found after $800,000 in exploration has been spent.

The mine would operate 255 days/year, producing 275 tons/day. The capital cost of the study mine would be $5,315,000 and require $798,000 in working capital.

The mill would operate 350 days/year at a throughput rate of 200 tons/day. The capital cost of the mill is estimated to be $2,940,000. The working capital cost of the mill is $294,000.

The combined mine and mill operating cost is $42.76/ton. A total of 62 persons would be employed in the mine and mill. The capital cost of the operation is $13.11/ton and the breakeven cutoff grade is calculated at 0.136 ounces/ton. The cost of producing an ounce of gold in this operation is $215/ounce. The base case gold value is assumed to be $480 Canadian or $365 U.S. currency.

The feasibility study completed sensitivity analyses on the critical items: tonnage, grade, operating cost, gold value, capital cost, and preproduction exploration costs.

The results of these studies are presented in the form of graphs. A pie graph indicates the distribution of revenue from the operation.

The conclusions of the study are that:

1) Gold deposits with over 100,000 ounces of gold are possible in Nova Scotia.
2) Such a gold deposit is an excellent investment. The study deposit (base case) has a 35.9% discounted cash flow.
3) The average grade of the deposit is the most sensitive item.

The original Caribou deposit, if found and mined today, would yield an after tax rate of return of about 25%. The original Goldenville deposit, if found and mined today, would yield a rate of return of about 55%.

There are numerous incentives available to operators in Nova Scotia. These include an established infrastructure, a good geological base, a reasonable tax and royalty system, and investment tax credits of at least 20% (50% in designated counties). Assistance in the form of loans or loan guarantees may be available on a case by case basis.

BASE CASE (CENTRAL NOVA SCOTIA MODEL)

SUMMARY	IMPERIAL UNITS
Total Tonnage:	630,000 tons
Tons Milled:	70,000 tons/year, 200 tons/day
Mine Life:	9 years
Head Grade:	0.26 ounces/ton
Recovery:	95%
Year 1 Value:	$480 Cnd.($365 U.S.)
Net Smelter Return:	98% of value contained
Operating Cost:	$42.76/ton

Mine:	$25.35
Mill:	12.25
General & Administration:	4.66
Reclamation:	0.50
Total:	$42.76

Inflation Value:	10%/year to year 4 operating cost 5%/year

CAPITAL COST	
Mine:	$5,315,000 ($ 8.44/ton)
Mill:	2,940,000 ($ 4.67/ton)
Total:	$8,255,000 ($13.11/ton)
	$41,275/ton per day throughput
Exploration:	prediscovery: $800,000
	postdiscovery: $100,000/year
Net Cash Flow:	$33,414,492 plus working capital
Net Present Value: (Discounted at 15%)	$ 7,772,676
Discounted Cash Flow Rate of Return:	35.9%

BASE CASE (CENTRAL NOVA SCOTIA MODEL)

SUMMARY	S.I. UNITS
Total Tonnage:	571,500 tonnes
Tonnes Milled:	63,500 tonnes/year, 180 tonnes/day
Mine Life:	9 years
Head Grade:	8.91 grams/tonne
Recovery:	95%
Year 1 Value:	$15.43/gram Cnd. ($11.74/gram U.S.)
Net Smelter Return:	98% of value contained
Operating Cost:	$47.13/tonne

Mine:	$27.94
Mill:	13.50
General & Administration:	5.14
Reclamation:	0.55
Total:	$47.13

Inflation Value:	10%/year to year 4 operating cost 5%/year

CAPITAL COST	
Mine:	$5,315,000 ($ 9.30/tonne)
Mill:	2,940,000 ($ 5.15/tonne)
Total:	$8,255,000 ($14.45/tonne)
	$45,498/tonne per day throughput
Exploration:	prediscovery: $800,000
	postdiscovery: $100,000/year
Net Cash Flow:	$33,414,492 plus working capital
Net Present Value: (Discounted at 15%)	$ 7,772,676
Discounted Cash Flow Rate of Return:	35.9%

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INTRODUCTION

This report is a preliminary feasibility study for an underground gold mine in Nova Scotia. The report was prepared to answer the question, "Could the Caribou or Goldenville deposits be profitable under current economic conditions?" The Caribou District (assumed to be undisturbed) was used as a basis for the study, but similar results could be expected for other gold districts in the Province given the same reserves. The assumed reserves (mineable, recoverable) are 630,000 tons at 0.26 ounces/ton.

The evaluation contained in this report describes the methods of mining and milling employed for this study, a brief history of the operation and a description of the geology. The report also discusses the valuation of the operation, including the net cash flow, taxes and royalties payable, and a statistical evaluation of assay occurrences on the 500 foot level of the former producer (Caribou). The advantages of operating and investing in an operation in Nova Scotia are also presented. A sensitivity analysis is included in this report, considering varying grade, operating costs, production costs, reserves, and price of gold versus the discounted cash flow rate of return.

Although this report mentions tonnages, grade, geology and location based on the old Caribou Mine, it is not meant to be a report on that or any other specific gold operation in Nova Scotia.

HISTORY OF GOLD MINING IN NOVA SCOTIA

Nova Scotia has had a long history of gold mining, beginning with the discovery of gold in beach sand by prospector John Campbell in 1849. The provincial production reached a high of 31,113 troy ounces in 1898, and totaled a reported 1,139,390 ounces up until 1976. The average Nova Scotia mine was a low tonnage, high grade mine. The 37 deposits which have produced over 1,000 ounces (Figure 1) had an average tonnage and grade of 68,675 tons at 0.453 troy ounces/ton. A summary of the gold production from past producers is given in the appendix.

The Goldenville and Caribou deposits produced considerably more than the average Nova Scotia gold mine. From the Goldenville District, 448,428 tons were mined at an average reported grade of 0.469 troy ounces/ton, and the Caribou produced 301,831 tons at an average reported grade of 0.36 troy ounces/ton. There are mineralized vein structures remaining at Caribou and at Goldenville.

The first gold deposits found in Nova Scotia were placer deposits which could be mined by panning or sluicing. Mining techniques changed to open cut and later to underground methods as bedrock veins were discovered.

The early underground mines employed the resuing method, whereby the waste wall rock adjacent to the narrow ore veins is mined separately to provide an adequate stoping width. This waste was used as backfill, and only the gold bearing quartz is transported from the mine. (The method is still employed to mine the gold reef ores of South Africa). Wider ore zones were mined by shrinkage stoping.

Over the past 115 years the Caribou Mine has had many owners and operators. The grade of the gold mined in the early years was very high at times (i.e. 1869 - 0.63 troy ounces/ton, 1870 - 0.81 troy ounces/ton, 1871 - 1.05 troy ounces/ton). The latest operator of the mine, Cominco, mined the deposit with a cutoff grade of 0.40 troy ounces/ton in 1946-47. Stopes of up to 20 feet wide followed zones containing multiple veins.

The Nova Scotia ores were free milling. The normal mill consisted of a stamp mill and a mercury amalgam plate (Figure 2). It was not until the late 1930's that cyanide plants were established, first at Upper Seal Harbour, Guysborough County and later at Montague, Halifax County. The Montague plant was eventually sold to the Goldenville Mine.

Today there is considerable interest in retreating the mine tailings from the former gold producers with cyanide, in addition to the interest in the exploration for lode deposits.

The Cambrian-Ordovician Meguma Group (gold bearing series) is considered to have great potential for additional lode gold deposits.

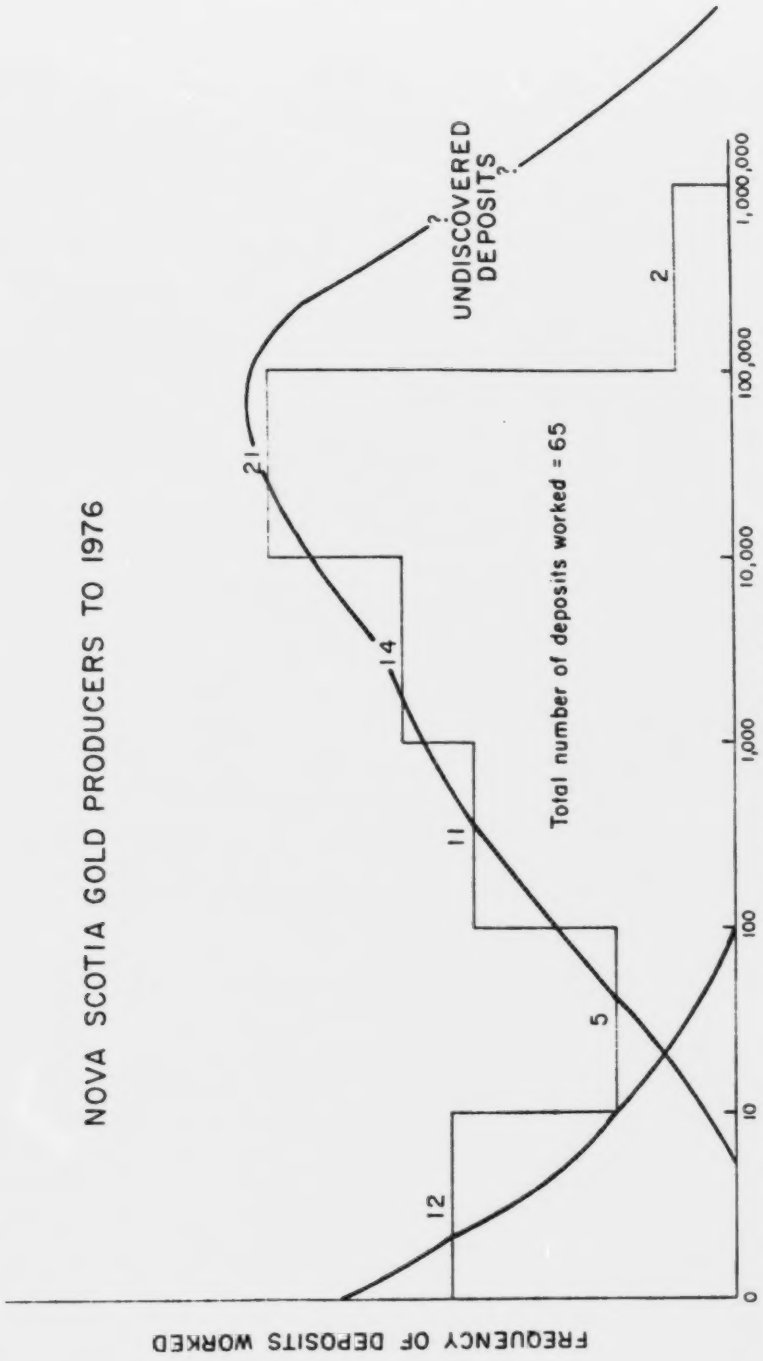
NOVA SCOTIA GOLD PRODUCERS TO 1976
FREQUENCY OF DEPOSITS WORKED
TROY OUNCES PRODUCED
(Log Scale)
0
10
100
1,000
10,000
100,000
1,000,000
Total number of deposits worked = 65
UNDISCOVERED DEPOSITS
?
?
12
5
11
14
21
2

FIGURE 1

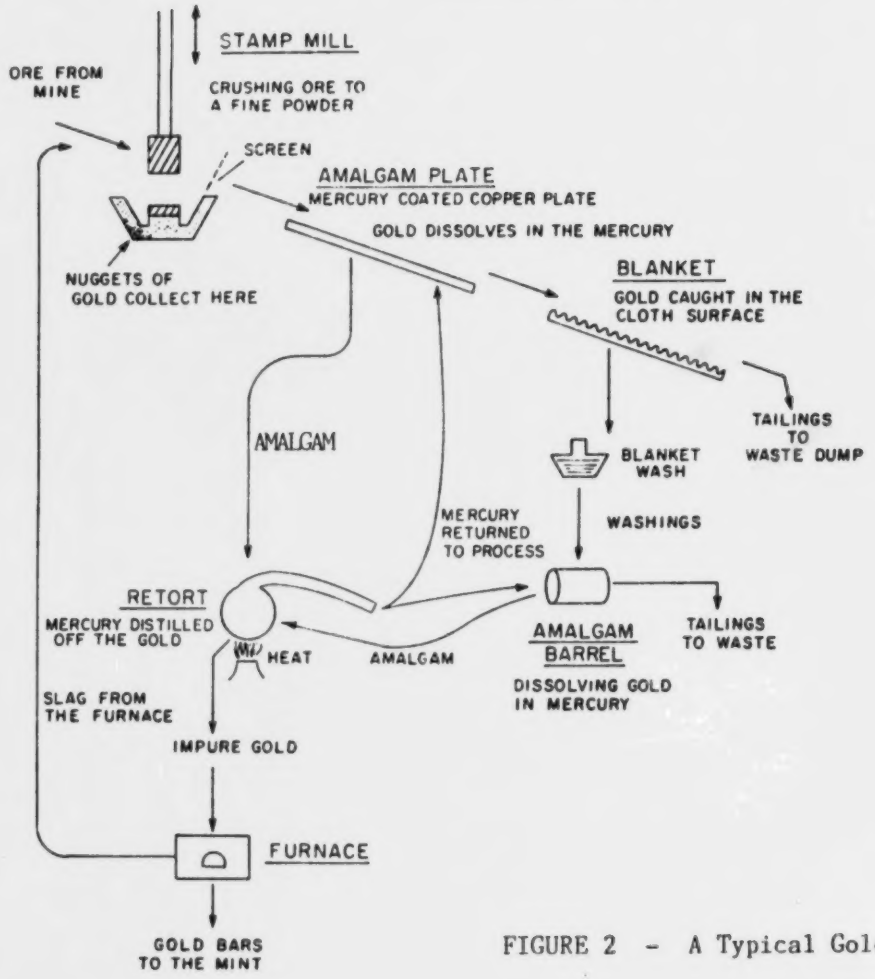

FIGURE 2 - A Typical Gold Mill in Nova Scotia (Circa 1900)

LOCATION AND LOCAL RESOURCES

The Caribou Gold District is located in Halifax County, approximately 50 miles by road northeast of Halifax (Figure 3). Local services, including schools, stores and a hospital, are located within a 15 mile radius of the mine area in both Upper and Middle Musquodoboit. A road from Upper Musquodoboit provides all weather access into the area and paved roads from Upper Musquodoboit provide access to Halifax, Truro and New Glasgow. Rail service provided by Canadian National is also available from Upper Musquodoboit. The Port of Halifax offers access to regular shipping and container service. Transport companies are available in both Halifax and Truro.

A single-phase, 14,400 volt power line exists in the area. Upgrading the existing single phase line to a three phase line would cost $2.50 per foot. To run a new three phase line into the area would cost $4.75 per foot (assuming favourable ground conditions). The Nova Scotia Power Corporation will normally provide 300 feet of overhead line free of charge as well as the transformers required for a substation when installing a new line. The regular monthly charges are based on the existing published rate of 3.97¢ per kilowatt hour. A demand charge, based on the maximum amount of power drawn over the two month billing period, is charged at $6.71 per kilovolt amperes. A reduction of 9.56% of the total monthly charges is available through provincial government assistance.

In the area, there is an ample supply of industrial and domestic water from wells and lakes. Telephone service is available through Maritime Telephone and Telegraph Company. Saw mills, machine shops and mechanical services can also all be obtained locally.

Due to the lack of mining in the region in the past 40 years, the number of skilled miners available would be insufficient to supply the workforce required for a new mine. There is, however, a large number of skilled and semiskilled people available in the area for training and employment.

Sufficient incentives exist in the area to entice other required persons to come into the region and remain for the life of the operation. Some of these incentives include established communities, ideal climate, recreation and entertainment facilities, universities and other such benefits associated with a large centre such as Halifax.

Equipment distributors and suppliers are also available in Halifax and Truro along with technical assistance from consulting firms and universities.

The Caribou location and infrastructure in place is typical of potential mine sites in Nova Scotia.

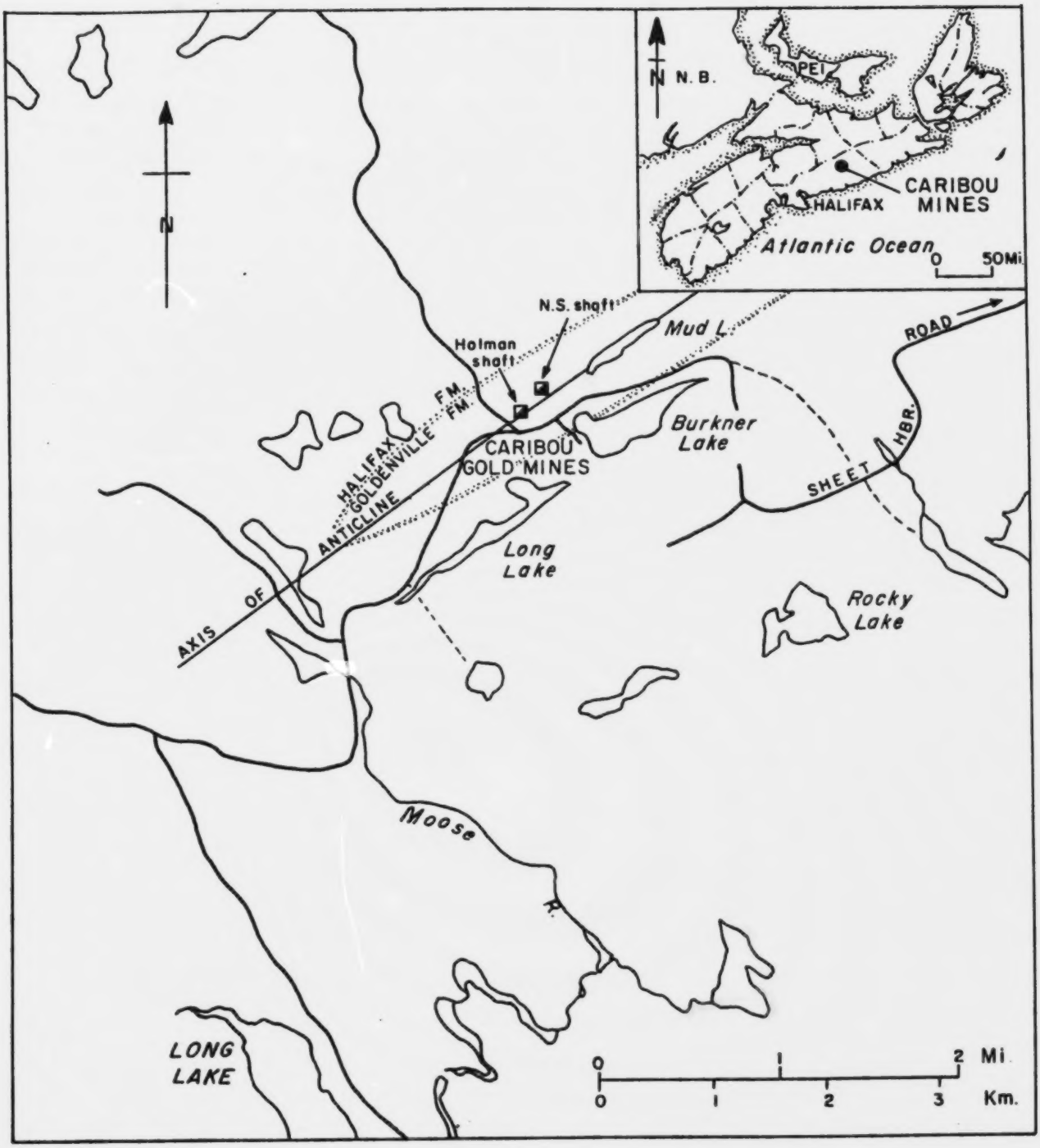

FIGURE 3 - Location Map

GEOLOGY OF THE CARIBOU AREA

The deposit is hosted by the Goldenville Formation of the Cambrian-Ordovician Meguma Group.

The gold mineralization is found in quartz veins situated on both the hinge and flank of a northeastward trending Caribou Anticline, a major domal structure formed during the Acadian tectonic event. The fold is relatively tight, with dips on the northern and southern limbs of approximately 60 to 70 degrees.

The gold bearing quartz veins are both parallel and perpendicular to the bedding (Figure 4).

Approximately 5% of the host rock is slate, quartz veins make up 10% and the remaining 85% is quartzite (meta greywacke). A certain amount of faulting has taken place in the area but the host rock is generally very competent.

There is a wealth of geological data on the gold deposits of Nova Scotia available in the files and library of the Nova Scotia Department of Mines and Energy.

ISOMETRIC OF ORE STRUCTURES OF THE CARIBOU MINE

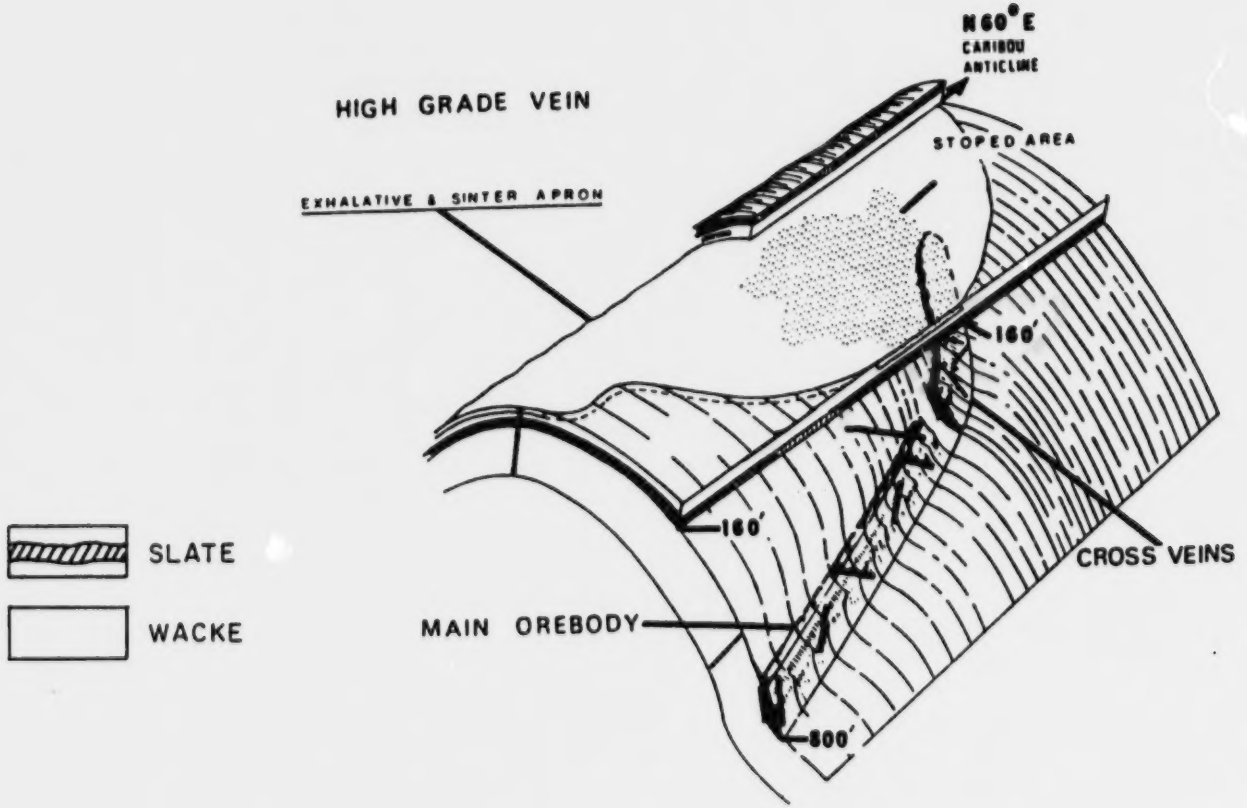

FIGURE 4 - Isometric Projection of the Caribou Mine

EXPLORATION

The deposit is assumed to have been located after the expenditure of $800,000 in exploration costs. Thereafter, $100,000 per year is spent on exploration. It is certainly possible that additional reserves would be located given this expenditure, however, the study does not assume any additional ore.

Shortly after the discovery of the deposit, provincial environmental authorities would be notified and a base line environmental monitoring program would be initiated.

The "discovered" deposit is assumed to be the Caribou. The potential of discovering a deposit such as is used in this study is considered high. Most of Nova Scotia is covered with a layer of Pleistocene till and unavailable for direct observation by the prospectors.

The Caribou District was developed from several shafts, however, this report assumes that all of the ore bodies could be developed from a central production shaft. In a specific case more than one production shaft may be warranted, but it is also likely that a portion of the ore could be mined using a lower cost method, such as open-pit mining.

MINING METHOD

The traditional mining method used in the Caribou District in the early years was the resuing method. Stopes of three feet wide followed rich gold bearing quartz veins of 12 to 18 inches thick. Waste material was packed behind the ensuing face to reduce the amount of material removed from the mine. The ore was taken to the surface in box cars.

For a modern day operation, a trackless method of extraction was deemed unfeasible due to the steeply dipping, narrow vein nature of the ore body and the limited tonnage. A system of track haulage using portable drills (stopers and jacklegs) was considered better suited to the ore body.

Shrinkage stoping was chosen as the mining method for this study due to the strong wall rock, steeply dipping nature of the ore, and the width of the ore body. In areas where the ore will not flow naturally, a method using slushers may have to be employed. Stulls may then be required for roof support. The stopes for this study were up to 20 feet wide and have an average stope height of 100 feet, with crown pillars left between levels. The size of the stopes permit mining by shrinkage stopes separated by pillars. These pillars could be recovered after the primary stopes have been mined.

It was assumed that two shafts sunk to a depth of 850 feet would provide access to the underground workings. The first shaft for exploration and development would be used as a downcast and a secondary exit. The cost of sinking the first shaft was estimated at $285/foot. The production shaft, containing one skip and a cage, would be used as an upcast and would carry water, air and power. The cost for this shaft is estimated at $370/foot.

Rail haulage drifts would provide access to the stopes for both men and materials and for ore haulage.

Drifts will be required in the footwall of 100 feet elevation intervals from the shaft to the ore zone. Overhead box cuts, cut from these drifts into the stopes, would be developed while raises are driven on either side of the stope. Access drifts would be driven from the raises to permit entrance into the stope for drilling. Once development has been completed, the first rounds would be blasted and broken ore would be pulled through the box holes to allow men to drill the next round. Most of the ore is left in the stope to provide a working surface for the miners, and also to give support to the walls. A disadvantage of this method is that a significant supply of ore is tied up in the stope (Figure 5). The "inventory allowance" does provide some tax relief for this situation.

A total of four stopes would be necessary for the production of 275 tons/day, with two stopes being in operation and two being developed.

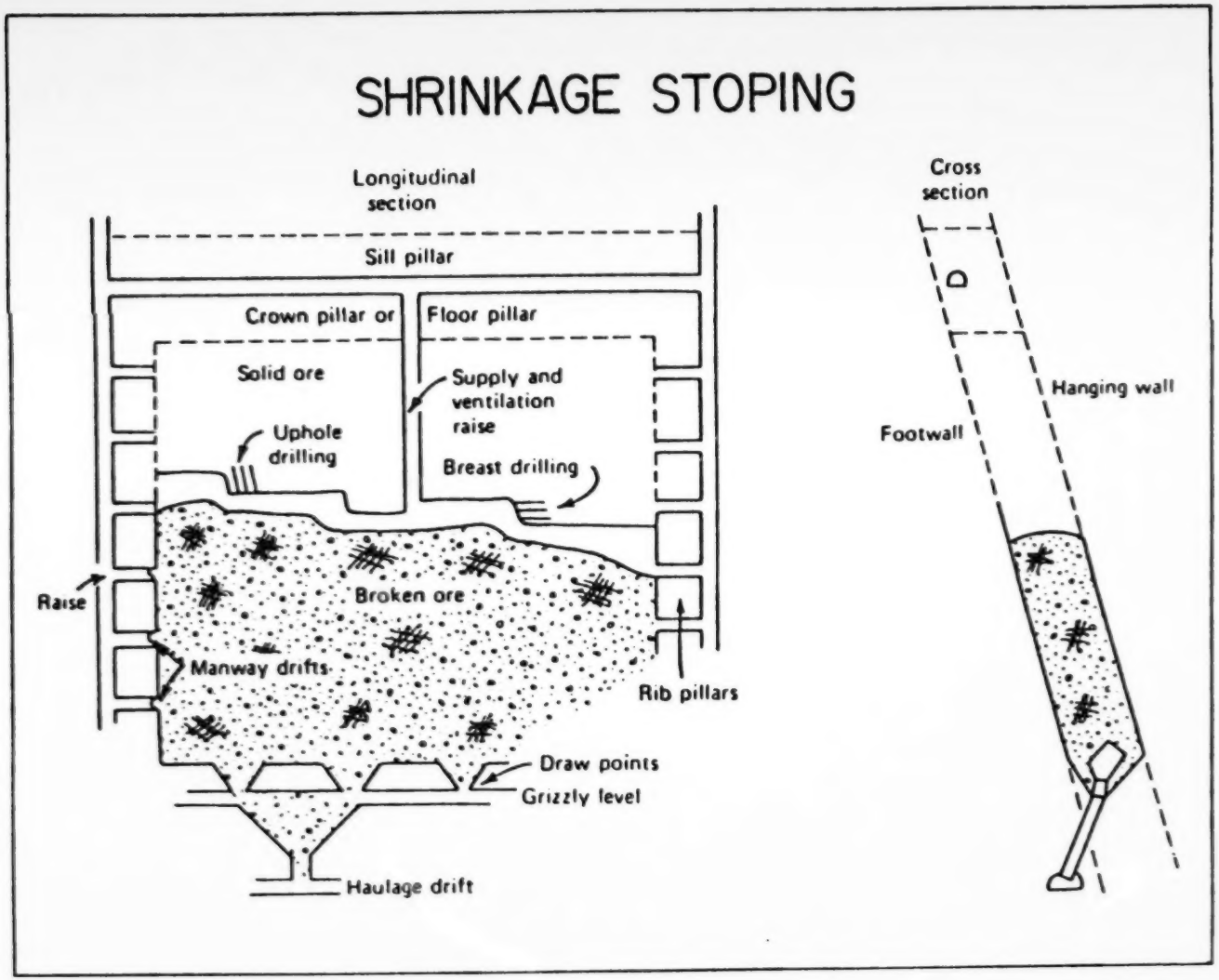

FIGURE 5 - A Typical Shrinkage Stope

MILL DESIGN

The mill designed for this study employs a total cyanidization and carbon-in-pulp treatment to remove the gold from the ore. The mill will treat 200 tons of gold ore per day for 350 days/year. Mill recovery is assumed to be 95%.

The ore is crushed in a two stage circuit and stored in a 1,000 ton stockpile. The crushing plant is operated on an 8 hour/day basis while grinding, cyanidization and absorption sections operate on a continuous 24 hour/day, 7 day/week basis.

Water is reclaimed from the tailings area for use in the grinding circuit. Excess water is chlorinated to destroy residual cyanide and released to a settling pond which overflows to the environment.

Tailings disposal could be carried out using trenches. When the trenches are full, the tailings are covered over with material which was removed from the trench. Federal and provincial environmental authorities would be consulted and all federal and provincial environmental protection regulations would be strictly adhered to.

METHODOLOGY

For this report the following assumptions are made:

1) From a study of grade distribution plans, geology and mining plans and reports written on the Caribou and Goldenville Mines, as well as a projection of mining costs, the available tonnage is assumed to be 630,000 tons at an average grade of 0.26 troy ounces/ton with break even cut-off grade of 0.136 troy ounces/ton.

2) The price of gold is assumed to be C$480/troy ounce for the first production year.

3) New equipment is assumed for the mine and mill; order of magnitude estimates are used, dealers have not been consulted.

4) The geometry of the deposit is asssumed to be similar to the ore won from the Holman and Nova Scotia shaft areas of the Caribou District.

A computerized cash flow model has been developed by the Mining Engineering Division to aid in the feasibility study. This model allows the operator to determine the present value and the discounted cash flow rate of return of a deposit within about 10%. Parameters can be quickly varied to identify the most critical items.

Figure 6 illustrates the cumulative net cash flow from the base case model and Figure 7 illustrates the discounted cash flow rate of return (D.C.F., R.O.R.) of the base case.

VALUATION

All equipment costs quoted in this report are based on the value of new equipment. Capital and operating costs for the mine and mill have been generated by the Mining Engineering Section with the aid of: the CIM publication Special Volume 25, T. A. O'Hara's article (1980), and Acres Davy McKee report "Conceptual Design of a 200 ton/day Gold Plant, Case 2: Total Cyanidation/C.I.P." (See bibliography).

The mine and mill are designed to handle and produce 275 tons and 200 tons respectively. The number of persons required for the mine, mill, and administration is 62.

The operating cost is estimated to be $42.76/ton, including $0.50/ton for reclamation.

It is recognized that used equipment could be purchased and installed for far less capital outlay, however, the cost of new equipment has been used to make the results of the study more conservative.

TABLE 1

COST AND OPERATING SUMMARY

Capital Cost for Underground Mine	$ 5,315,000
Capital Cost for Mill	$ 2,940,000
Total Capital Cost	$ 8,255,000
Working Capital Cost for Underground Mine..	$ 798,000
Working Capital Cost for Mill	$ 294,000
Total Working Capital	$ 1,092,000
TOTAL CAPITAL INVESTMENT.....	$ 9,347,000
Mine/Mill Operating Cost.....	$42.26/ton
Reclamation Sinking Fund	$ .50/ton
Mine Production	275 tons/day
Mill Production	200 tons/day
Mill Production	70,000 tons/year
Number of Operating Days for Mine	255 days/year
Number of Operating Days for Mill	350 days/year
Cost per Ton (ore), including capital	$55.87/ton
Cutoff Grade	0.136 troy ounces/ton
Cost/Troy Ounce Produced	$214.88

TABLE 2

DETAILED CAPITAL COST OF MILL

Mill Capital Cost	Total Cost	Cost/Ton*
Mechanical Equipment	$1,440,500	2.29
Buildings and Structures	$ 461,500	0.73
Electrical	$ 300,000	0.48
Instrumentation	$ 25,000	0.04
Piping	$ 138,800	0.22
Tailings Disposal	$ 88,000	0.14
Site Work	$ 24,900	0.04
Front End Loader	$ 150,300	0.24
Construction Indirects	$ 153,000	0.24
Engineering	$ 158,000	0.25
Total Capital Cost for Mill	$2,940,000	4.67
Total Working Capital Cost for Mill ... (10% of Capital Investment)	$ 294,000	
Total Capital Investment for Mill	$3,234,000	

*Assumed Reserves of 630,000 tons

TABLE 3

DETAILED CAPITAL COST OF MINE

	Total Cost	Cost/Ton*
Shaft Sinking		
1) Ventilation/Exploration Shaft (8'x 6')	$ 242,250	$ 0.38
2) Production Shaft (16'x 8')	$ 314,500	$ 0.50
Total Shafts	$ 556,750	
Mine Development	$1,432,000	$ 2.27
Hoist Plant		
Hoist Equipment	$ 481,250	$ 0.76
Hoist Installation Cost	$ 127,000	$ 0.20
Hoist Room Cost	$ 118,000	$ 0.19
Headframe Complex	$ 184,000	$ 0.29
Total for Hoist Plant	$ 916,000	
Mine Compressor Plant		
Compressor Equipment Cost	$ 290,000	$ 0.46
Compressor Installation Cost	$ 63,000	$ 0.10
Total Mine Compressor Plant	$ 353,000	
Underground Mining Equipment	$ 885,000	$ 1.40
Underground Maintenance Facilities	$ 332,000	$ 0.53
Feasibility Design	$ 266,000	$ 0.42
Supervision, Camp	$ 358,000	$ 0.57
Administration, Accounting, Legal, Key Staff.	$ 224,000	$ 0.36
Total Capital Cost for Mine	$5,315,000	$ 8.44
Total Working Capital Cost for Mine (15% of Capital Investment)	$ 798,000	
Total Capital Investment for Mine	$6,113,000	

*Assumed Reserves of 630,000 tons.

TABLE 4

MINE/MILL TOTAL OPERATING COST

Employees			
Operating Labour Underground	42		
Administration	7		
Mill	13		
Total Employees	62		
Operating Costs, Supplies, Power Underground*		Cost/Ton	
Labour	$5,400/day	$19.67	
Supplies	$1,560/day	$ 5.68	
Subtotal			$25.35
Mill**			
Labour	$1,100/day	$ 5.50	
Supplies	$ 900/day	$ 4.50	
Power	$ 450/day	$ 2.25	
Subtotal			$12.25
Wages/Administrative Expenses*			
Supplies-General Plant Services*	$ 122/day	$ 0.44	
General Administration Wages .	$ 815/day	$ 2.97	
General Expenses	$ 344/day	$ 1.25	
Subtotal			$ 4.66
Total Mine/Mill Operating Cost			$42.26
Reclamation			$ 0.50
TOTAL			$42.76

* $\frac{\text{Cost/day x 255 days/yr.}}{\text{70,000 tons/yr.}}$ = $/ton

** $\frac{\text{Cost/day x 350 days/yr.}}{\text{70,000 tons/yr.}}$ = $/ton

INFLATION (BASE CASE ONLY)

Gold price was inflated 10% per year in production years 2, 3 and 4.

Smelter costs were maintained at 2% of the gold price.

Operating costs were inflated 5% per year through the production life of the mine.

BREAK EVEN CUTOFF GRADE

The break even cutoff grade, as calculated, is 0.136 troy ounces/ton. This was found by assuming a mill recovery of 0.95% and mine dilution of 10%.

Operating Cost	$ 42.26
Reclamation	0.50
Total	$ 42.76
Capital	13.11
TOTAL	$ 55.87

$$\frac{\$55.87}{0.90 \times 0.95} = \$65.35$$

$$\text{Break Even: } \frac{\$65.35/\text{ton}}{\$480/\text{troy oz.}} = 0.136 \text{ troy ounces/ton in situ}$$

Normally, a company would add a profit margin to the break even price, making the cutoff grade slightly higher. The cutoff grade should actually be set so as to maximize the net present value of the deposit. For this study, a simple break even cutoff grade will be used.

FEDERAL AND PROVINCIAL INCOME TAX

The federal tax rate is currently an effective 36% of taxable income (operating profit less resource allowance, capital cost allowance, Canadian development expense (CDE), Canadian exploration expense (CEE), prior year's losses, inventory allowance, and earned depletion allowance) less the investment tax credit. All government grants and most kinds of assistance related to exploration or development will reduce the amount of eligible expenditures for the purpose of calculating cumulative CEE and cumulative CDE. The investment tax credit is available to reduce the federal taxes otherwise payable. In the Atlantic Provinces, the credit is 20% of the cost of qualified assets. Certain areas within Nova Scotia are eligible for a tax credit of up to 50% of qualified assets (i.e. Guysborough County, site of the Goldenville deposit).

The provincial tax rate in Nova Scotia is currently 15% of taxable income. In this example, the mine was considered to be an isolated income earning entity. For a specific mine, the optimum tax position should be determined by a tax expert. Tax calculations are shown in Table 2.

In this study, the 3% inventory allowance was not considered.

MUNICIPAL TAX

The municipal tax rate in Halifax County is currently $1.75 per $100 of assessment. It was assumed that the mine is assessed at 100% of its capital value in year 1, and at 50% of its capital value thereafter. For federal and provincial tax purposes, municipal tax is deductible as an operating cost.

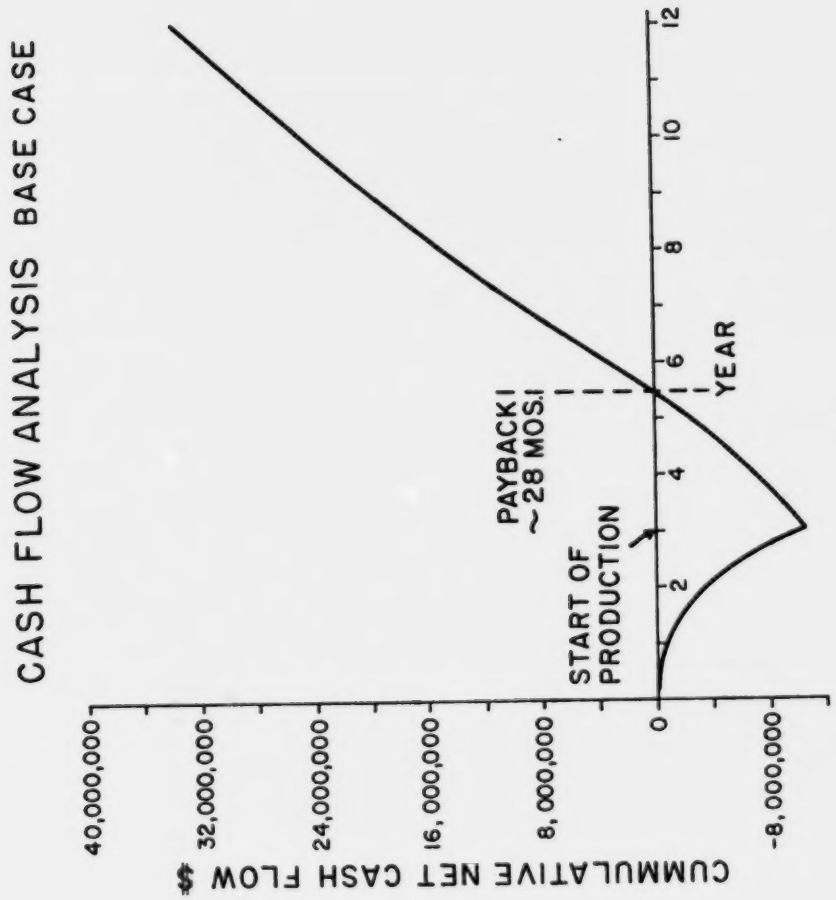
CASH FLOW ANALYSIS BASE CASE
CUMMULATIVE NET CASH FLOW $
40,000,000
32,000,000
24,000,000
16,000,000
8,000,000
0
-8,000,000
START OF PRODUCTION
PAYBACK! ~28 MOS.!
YEAR
2
4
6
8
10
12

FIGURE 6

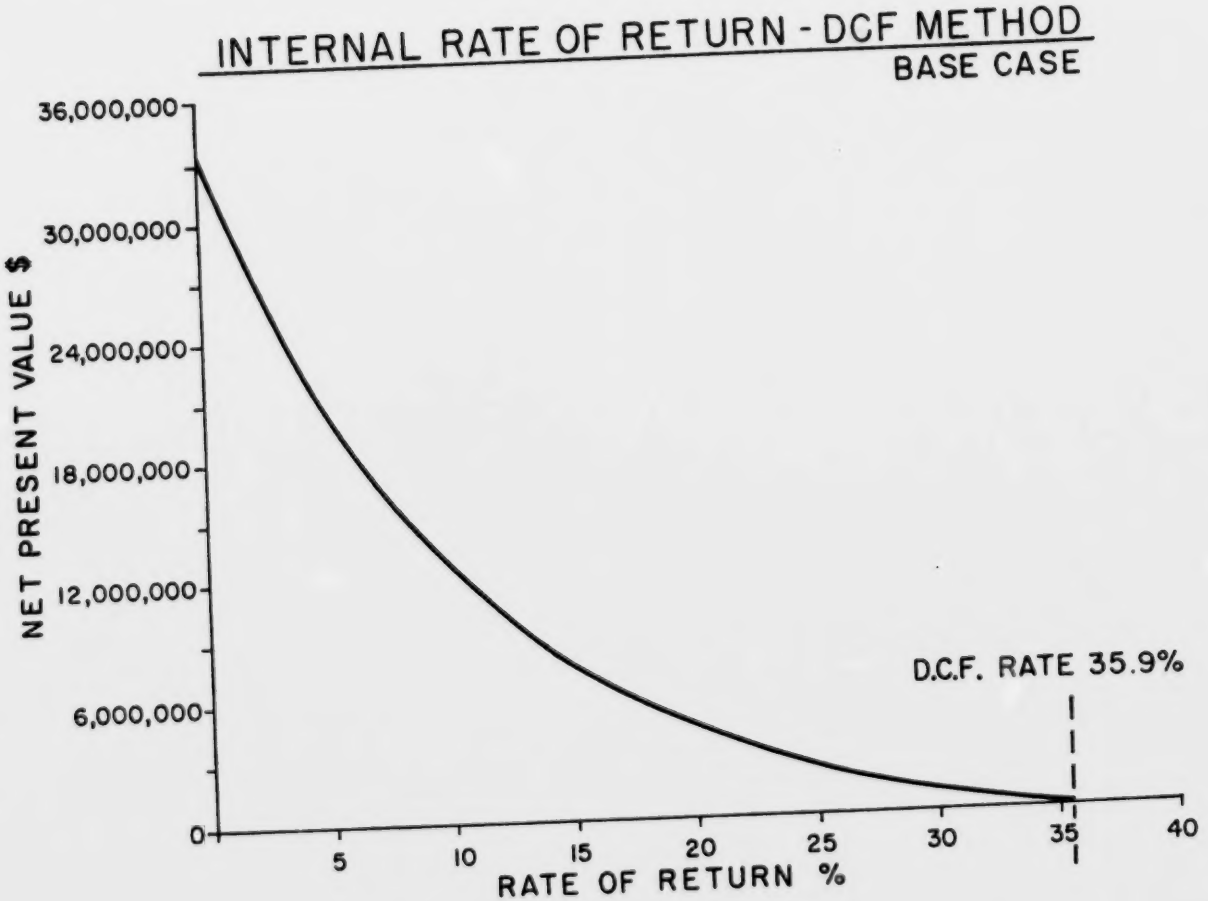
INTERNAL RATE OF RETURN - DCF METHOD
BASE CASE
36,000,000
30,000,000
24,000,000
18,000,000
12,000,000
6,000,000
0
NET PRESENT VALUE $
D.C.F. RATE 35.9%
5
10
15
20
25
30
35
40
RATE OF RETURN %

FIGURE 7

NET CASH FLOW
($000's)
TABLE 5

	YEAR	1	2	3	4	5	6	7	8	9	10	11	12	Totals	
1	Tons of Ore Milled (tons)				70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	70,000	630,000	1
2	Grade (ounces/ton)				0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	0.26	2
3	Recovered Gold, oz. (95% Recovery)				17,290	17,290	17,290	17,290	17,290	17,290	17,290	17,290	17,290	155,610	3
4	Price				480	528	581	639	639	639	639	639	639		4
5	Gross Revenue				8,299	9,129	10,455	11,048	11,048	11,480	11,480	11,480	11,480	93,764	5
6	Smelter Cost				166	183	201	221	221	221	221	221	221	1,873	6
7	Net Smelter Return				8,133	8,947	9,845	10,827	10,827	10,827	10,827	10,827	10,827	91,888	7
8	Operating Cost				2,933	3,143	3,300	3,465	3,638	3,820	4,011	4,212	4,422	33,005	8
9	Municipal Tax				145	72	72	72	72	72	72	72	72	723	9
10	Total Operating Cost				3,138	3,215	3,372	3,537	3,710	3,892	4,083	4,284	4,495	33,728	10
11	Operating Profit				4,995	5,731	6,472	7,290	7,117	6,935	6,744	6,543	6,333	58,160	11
12	Capital Expenditures - Mill - Note 1		200	2,640										2,940	12
13	Capital Expenditures - Mine - Note 2		2,300	3,015										5,315	13
14	Working Capital			1,092										1,092	14
15	Exploration Expenditures	800	100	100	100	100	100	100	100	100	100	100	100	1,900	15
16	Interest on Outstanding Capital - Note 3		80	358	1,079	713	239							2,469	16
17	Provincial Royalty				163	179	424	543	534	524	514	504	423	3,878	17
18	Provincial Taxes						145	288	281	274	266	258	249	1,760	18
19	Federal Taxes							462	707	891	1,026	1,121	1,184	5,392	19
20	Working Capital Recovery												1,092	1,092	20
21	After Tax Profit				3,654	4,739	5,565	5,897	5,595	5,146	4,873	4,560	5,399	44,201	21
22	Cash Flow	-800	-2,780	-7,205	3,654	4,739	5,565	5,897	5,595	5,146	4,873	4,560	5,399	44,201	22
23	Net Cash Flow	-800	-3,580	-10,785	-7,131	-2,392	3,173	9,070	14,565	19,710	24,548	29,108	34,507		23

Note 1: Capital for Mill is assumed to be eligible for Capital Cost Allowance, Class 28.

Note 2: Mine capital is assumed to be eligible for Canadian Exploration Expense.

Note 3: Interest rate is assumed to be 10%.

TAXES PAYABLE

($000's)

TABLE 6

	YEAR	1	2	3	4	5	6	7	8	9	10	11	12	Totals	
1	Gross Revenue (N.S.R.)				8,133	8,947	9,845	10,827	10,827	10,827	10,827	10,827	10,827	91,888	1
2	Less: Operating Expenses				3,138	3,215	3,372	3,537	3,710	3,892	4,083	4,284	4,495	33,728	2
3	Net Revenue				4,995	5,731	6,472	7,290	7,117	6,935	6,744	6,543	6,333	58,160	3
4	Less: C.C.A.[1]				1,470	1,470									4
5	Resource Profit				3,525	4,261	6,472	7,290	7,117	6,935	6,744	6,543	6,333	55,220	5
6	Less: Resource Allowance				881	1,065	1,618	1,823	1,779	1,734	1,686	1,636	1,583	13,805	6
7	Less: Interest Expenses					425	239								7
8	Less: C.E.E.[2]				2,644	2,771	100	100	100	100	100	100	100		8
9	Net Resource Profit					425	4,515	5,368	5,238	5,101	4,958	4,807	4,650	35,061	9
10	Depletion Allowance					425	33	33	33	33	33	33	33		10
11	Income						4,482	5,334	5,204	5,068	4,925	4,774	4,616		11
12	Prior Years Losses						1,805								12
13	Taxable Income						2,677	5,334	5,204	5,068	4,925	4,774	4,616	32,598	13
14	Basic Federal Tax (36%)						964	1,920	1,874	1,824	1,773	1,719	1,662	11,735	14
15	Investment Tax Credit						964	1,458	1,167	933	747	597	478		15
16	Net Federal Tax							462	707	891	1,026	1,121	1,184	5,392	16
17	Net Provincial Tax						145	288	281	737	266	258	249	1,760	17
18	N. S. Provincial Royalties				162	179	424	543	534	524	514	504	493	3,878	18

1. Capital Cost Allowance
2. Canadian Exploration Expense

ROYALTIES PAYABLE
($000's)
TABLE 7

	YEAR	1	2	3	4	5	6	7	8	9	10	11	12	Totals	
1	Net Smelter Return (N.S.R.)				8,133	8,947	9,845	10,827	10,827	10,827	10,827	10,827	10,827	91,888	1
2	Operating Profit				4,995	5,731	6,472	7,290	7,117	6,935	6,744	6,593	6,333	58,160	2
3	Exploration Expenses	800	100	100	100	100	100	100	100	100	100	100	100	1,900	3
4	Total Capital for Depreciation				4,895	5,631	6,372	7,190	7,017	6,835	6,644	6,443	6,233	57,260	4
5	Accelerated Depreciation				3,619	4,223	408							8,255	5
6	Net Income after Depreciation				-1,077	-1,345	2,826	3,620	3,560	3,496	3,429	3,359	3,285	21,155	6
7	Processing Allowance				2,352	2,748	3,138	3,570	3,457	3,339	3,215	3,084	2,947	2,785	7
8	N. S. Provincial Royalties Payable				163	179	424	543	534	524	514	504	493	3,878	8

SENSITIVITY

Sensitivity analysis has been done on the critical items: grade, tonnage, gold-selling price, capital cost and operating cost. The critical item was varied while all other items were held constant.

It was found that the study mine would still have a net present value (N.P.V.) of 15% if:

The head grade decreased to 0.212 ounces/ton (18.5% decrease)

- or -

The recoverable tonnage decreased to 470,000 tons(25.4% decrease)

- or -

The price of gold dropped to $280 U.S.($368 Cdn.)(23.3% decrease)

- or -

Capital costs increased 57.5%.

- or -

Operating costs increased 63.5%.

- or -

Preproduction exploration expense increased to $3.4 million. (325% increase)

This analysis indicates that this project is most sensitive to the grade of the deposit. The project management is advised to place a great deal of effort into verification of the grade of the deposit. The sensitivity analysis indicates that the exploration expense (preproduction) could be increased considerably to firm up the grade and tonnage estimates. Figures 8 to 13 illustrate the sensitivity of the base case to the critical items.

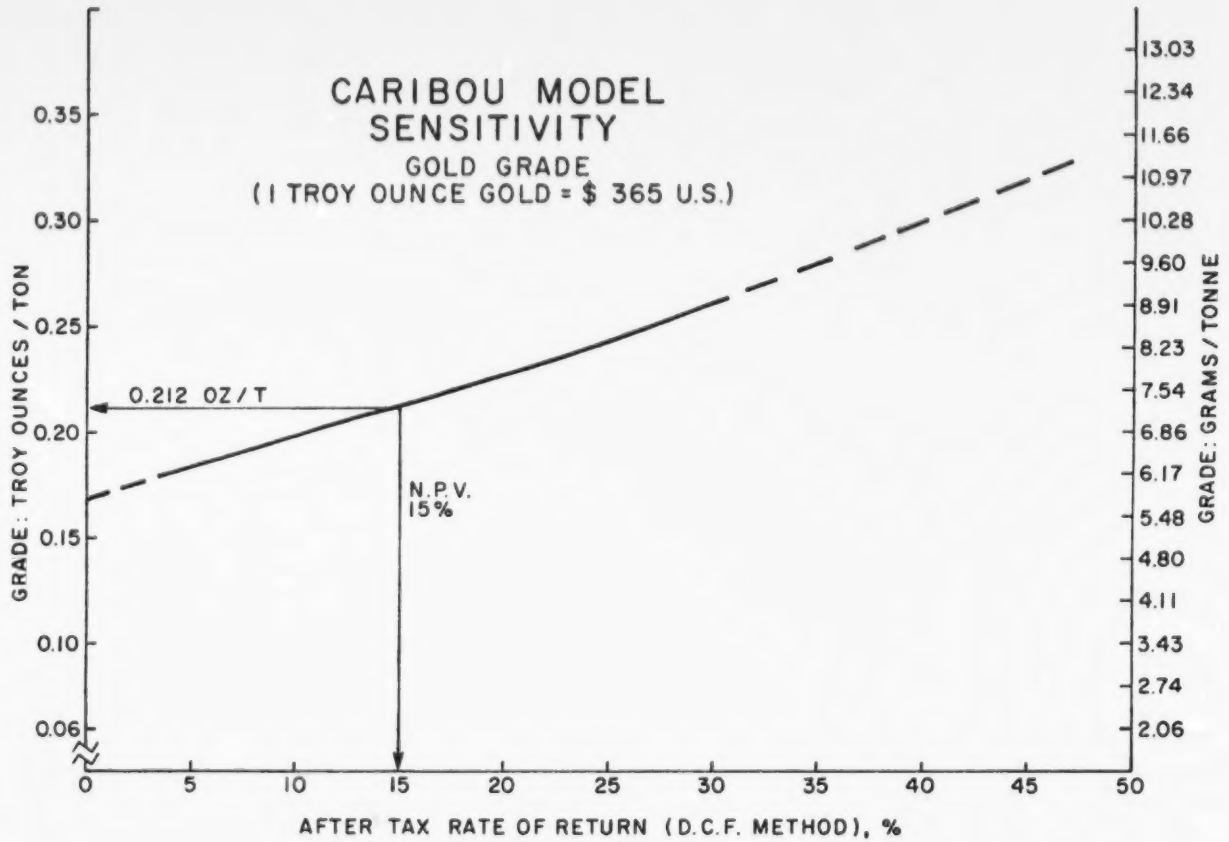

FIGURE 8 - Base Case Sensitivity to Gold Grade

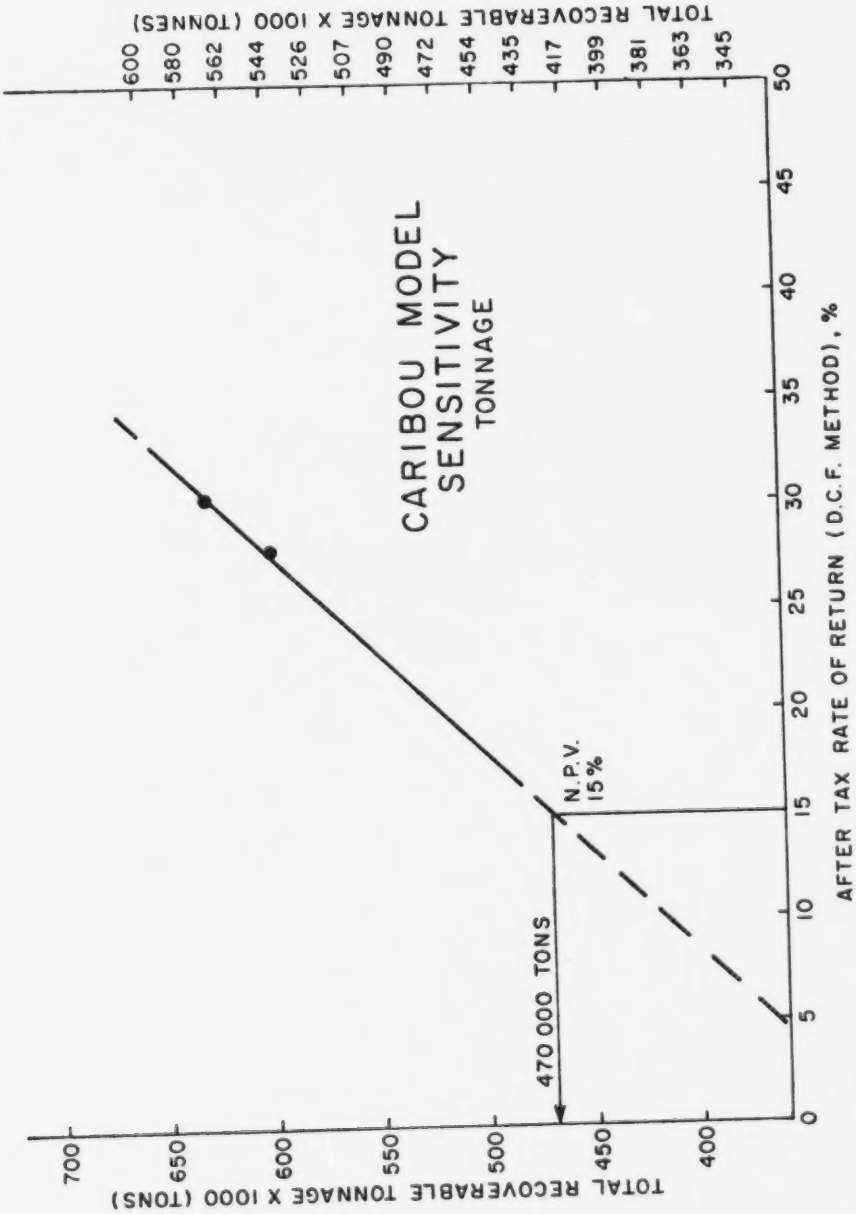

FIGURE 9 - Base Case Sensitivity to Tonnage

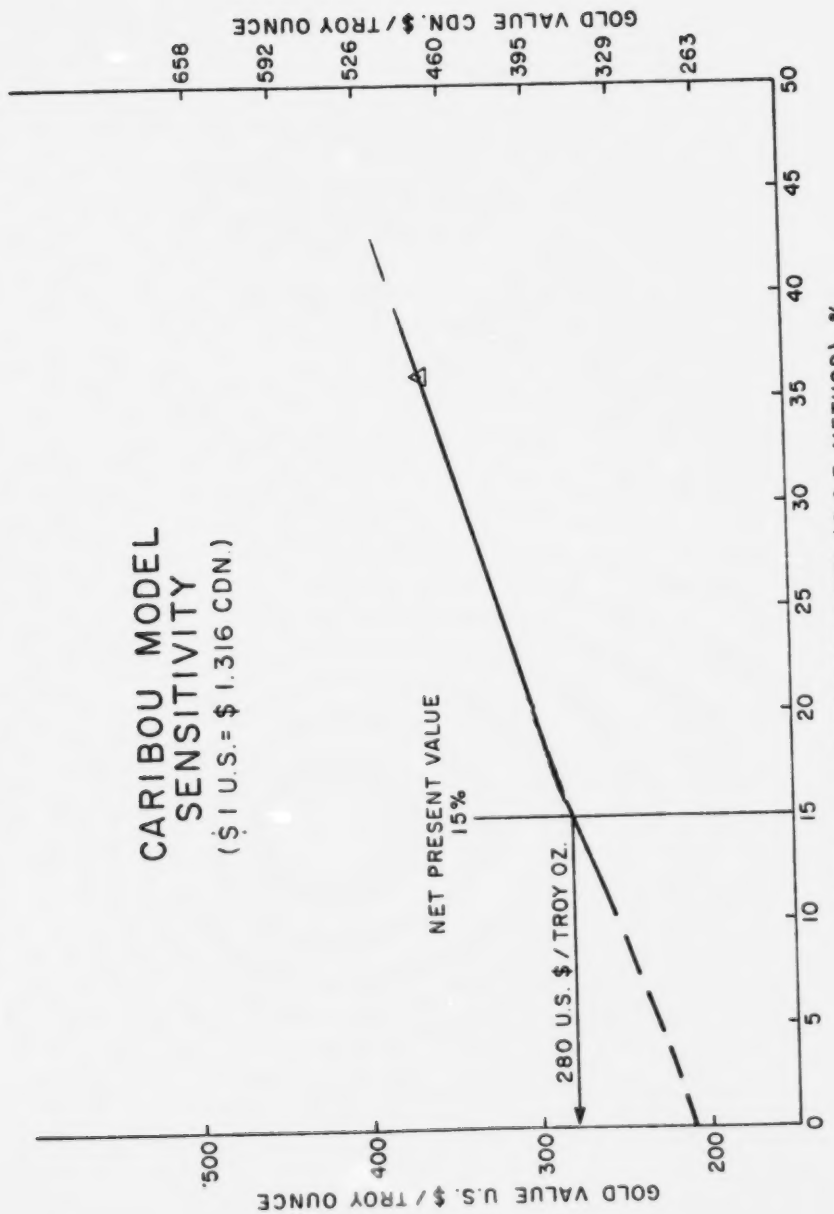

FIGURE 10 - Base Case Sensitivity to Gold Price

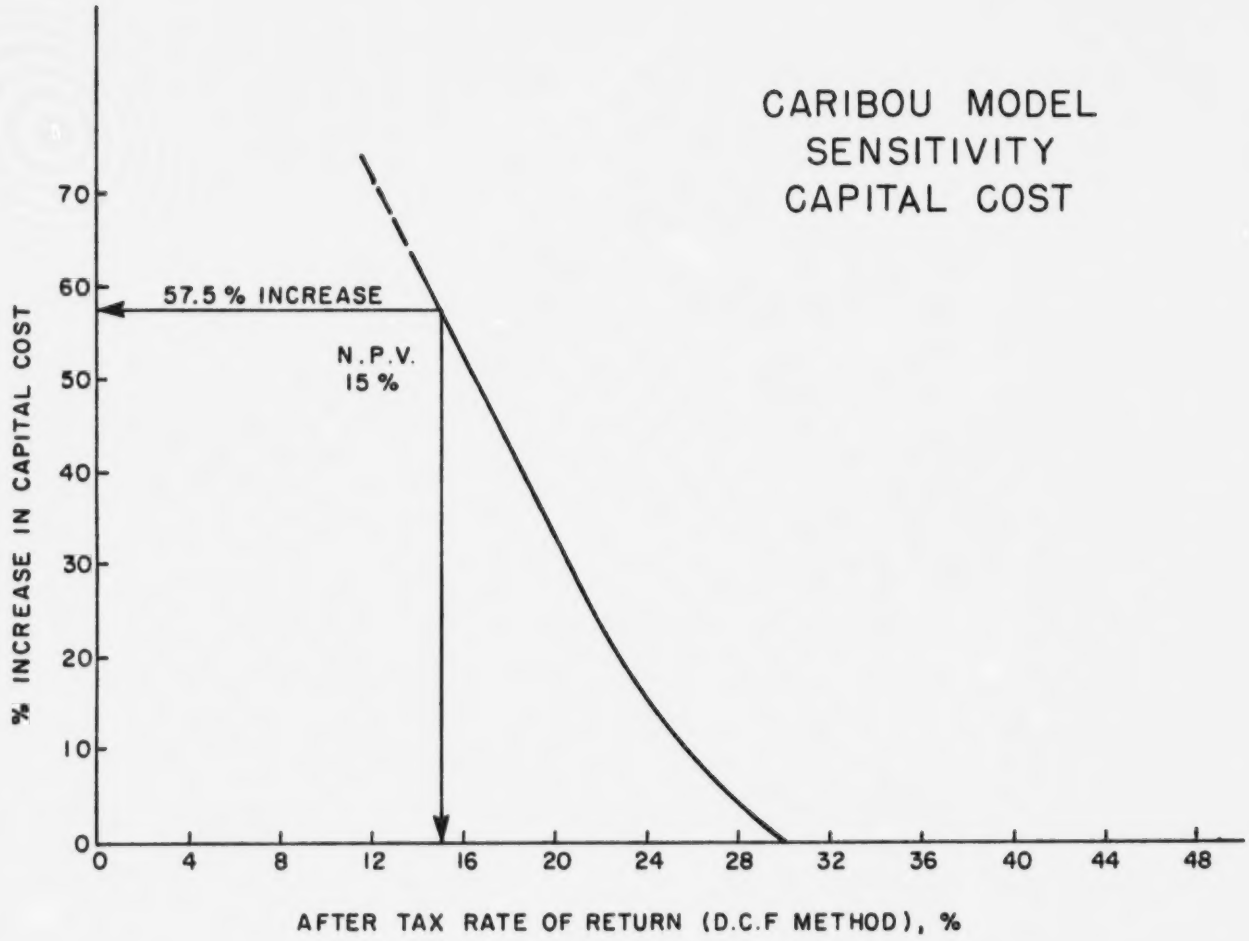

FIGURE 11 - Base Case Sensitivity to Capital Cost

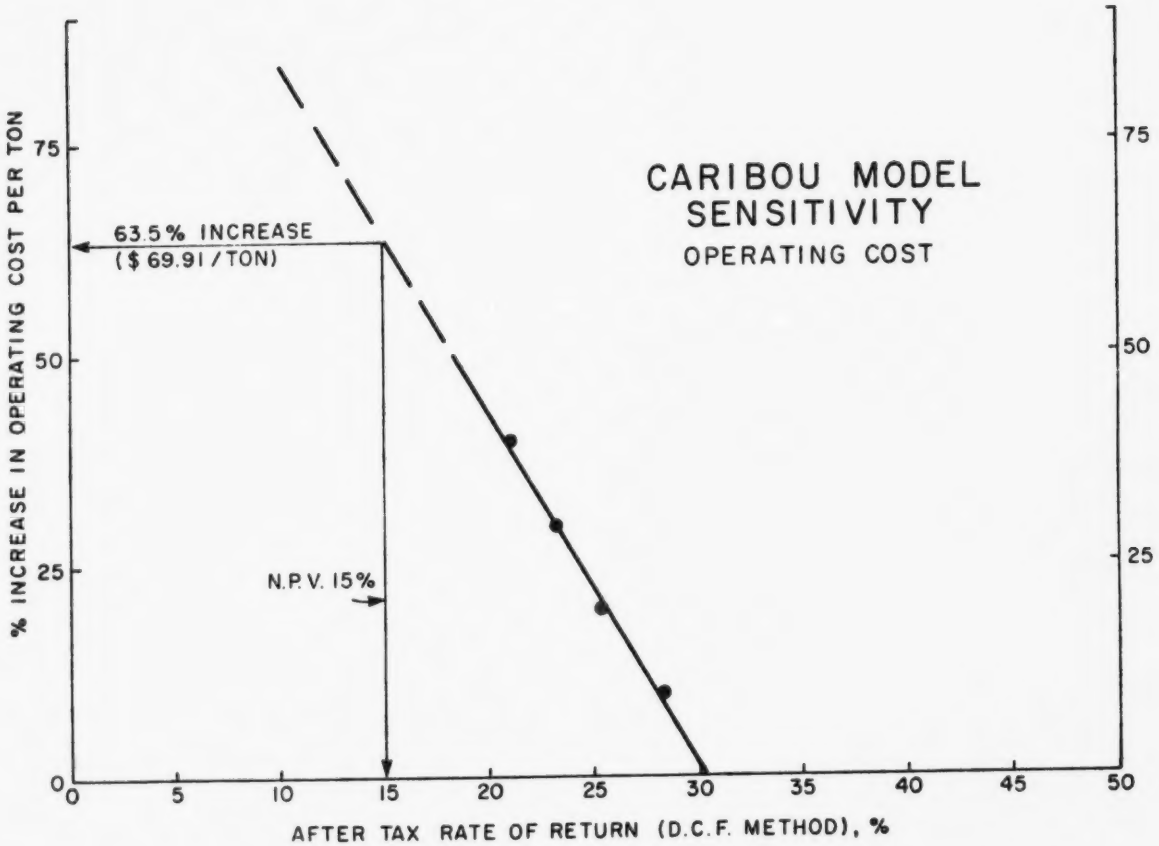

FIGURE 12 - Base Case Sensitivity to Operating Cost

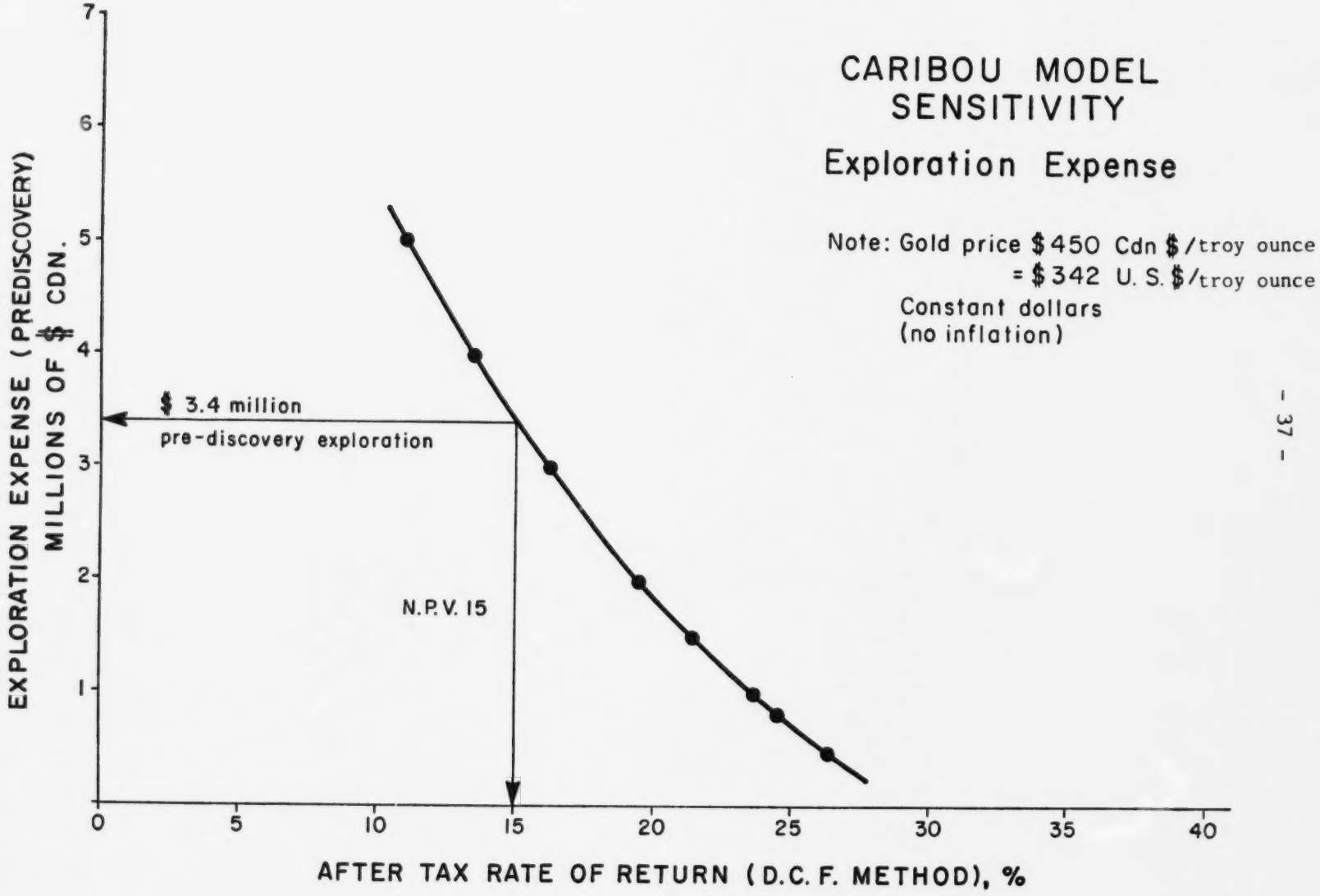
CARIBOU MODEL
SENSITIVITY
Exploration Expense
Note: Gold price $450 Cdn $/troy ounce
= $342 U. S. $/troy ounce
Constant dollars
(no inflation)
EXPLORATION EXPENSE (PREDISCOVERY)
MILLIONS OF $ CDN.
$ 3.4 million
pre-discovery exploration
N.P.V. 15
AFTER TAX RATE OF RETURN (D.C.F. METHOD), %
0
5
10
15
20
25
30
35
40
1
2
3
4
5
6
7

FIGURE 13

CONCLUSION

1) A Caribou type deposit would be economical if discovered today, in fact, it would provide an excellent rate of return.

2) For a deposit with reserves and geology similar to the Caribou, a rate of return in the order of 25% could be expected on an investment of less than $10 million. The Goldenville deposit, if found and mined today, would yield about 55% after tax return on investment.

3) Nova Scotia has a history of gold mining dating back to 1849. The past producers were high grade, low tonnage deposits, with the exception of the Goldenville and Caribou Districts. The potential for deposits of the type described in this study, given the extent of the glacial till cover, is high.

4) Nova Scotia has the infrastructure, climate, recreational facilities, cities, and ports rarely available to the Canadian miner. This infrastructure not only makes it easier to do business, it is attractive to the mine workforce. The mine is able to attract and retain skilled people.

BIBLIOGRAPHY

Acres Davey McKee

Conceptual Design of a 200 ton/day Gold Plant, Case 2: Total Cyanidation/C.I.P.; Rexdale, Ontario, 1982

Clarkson Gordon

Mining Taxation in Canada; Toronto, Ontario, 1983

Mular, A. L.

Mining and Mineral Processing Equipment Costs and Preliminary Capital Cost Estimations; Canadian Institute of Mining and Metallurgy, Special Volume 25, 1982

O'Hara, T.A.

Quick Guides to the Evaluation of Orebodies; Canadian Institute of Mining and Metallurgy, February, 1980, p. 87-99

Price Waterhouse

Canadian Mining Taxation; Toronto, Ontario, 1983

APPENDIX

Provincial Royalties ..... A - 1

Net Present Value Calculations ..... A - 2

Assay Occurrences for the 500 foot Level ..... A - 3

Caribou Gold District Production Figures ..... A - 4

PROVINCIAL ROYALTIES

The provincial royalty system has recently been adjusted to allow for accelerated depreciation during the early operating life of the mine. In Nova Scotia, royalties may be imposed by order of the Governor in Council (Section 99 of the Mineral Resources Act) or, in lieu of a royalty imposed under Section 99, the Minister, upon notification in writing to the lessee and operator may impose an annual royalty of:

(a) 2% of the net smelter returns, or

(b) 15% of all net income derived from a mining operation,

whichever is greater, and in the event the two amounts are equal the operator shall pay according to clause (a), Section 103 of the Mineral Resources Act.

The following is a detailed calculation of the royalties payable by this situation.

In this case, royalties were calculated using the following formula:

$$\frac{\text{Net Smelter Return} \times 0.02}{0.15} = \text{Net Income} - X - \text{Processing Allowance}$$

Where net income = operating profit - exploration expenses

X = depreciation

Processing allowance = (0.15 [net income - X])

i.e. For Year 1 ($000's)

Net Smelter Return	=	$11,252
Operating Profit	=	$ 8,117
Exploration Expenses	=	$ 100

Substituting and Solving for X:

$$\frac{11{,}252 \times 0.02}{0.15} = 8117 - 100 - X - 0.15\,([8117-100]-X)$$

$$1500.27 = 6814.45 - 0.85X$$

$$X = \frac{5314.18}{0.85}$$

$$X = \$6251.98$$

Therefore, the amount of accelerated depreciation available is $6251.98. This amount is deducted from the available capital to be depreciated, in this case $9,255 ($8,255 capital + $1,000 exploration expenses). If the amount of capital to be depreciated is less than the calculated amount of accelerated depreciation (as is the case in year 2), then the remaining amount of capital to be depreciated is taken as the amount of accelerated depreciation. For year 3, when the capital is fully depreciated, X = O is substituted into the equation.

Capital is depreciated at 100% of its value for the first three years of the operation, and at 30% for subsequent years.

Processing allowance is 8% of milling assets, subject to greater than 15% of net income (N.I.) after depreciation and less than 65% of net income after depreciation.

8% of milling assets, where milling assets = $2,940 is:

$$0.08 \times \$2{,}940.02 = 235.2$$

15% of net income after depreciation, where net income after depreciation = $1,765.02 is:

$$0.15 \times \$1{,}765.02 = 264.75$$

Since the 15% is greater than the 8%, the 15% is substituted into the equation as the processing allowance.

The righthand side of the equation = $1,500.3.

Royalties are calculated using the greater of:

a) 2% of net smelter return

b) 15% of (net income after depreciation - processing allowance)

2% of N.S.R. = 0.02 X 11,252 = $225.04

15% of (N.I. - X - P.A.) = 0.15 X 1,500.3 = 225.04

Therefore the royalties due are $225.04.

NET PRESENT VALUE CALCULATION

The present value of the future income from the mine was determined by adding (algebraically) the cash flow of each of the future years, discounted at the desired interest rate. If the time value of money is not considered (i.e. NPV_O), then the cash flow would simply be added to give the net present value, i.e.:

Year	Cash Flow ($000's)	
1	- 800	
2	-2,780	
3	-7,205	
4		3,654
5		4,739
6		5,565
7		5,897
8		5,495
9		5,146
10		4,837
11		4,560
12		4,307
	10,785	44,200

Net present value at "O" discount rate

= 44,200 - 10,785 = 33,415 or $33,415,000.

Now it is generally understood that a dollar in the future is not worth a dollar today. Simply buying a Canada Savings Bond can generate 5% to 8% (after tax) income per annum. In order to determine the future value of each year's income, discounted to the appropriate rate, discount tables can be used or the amount can be determined using the formula:

$$P.V. = \frac{F.V.}{(1 + i)^n}$$

Where: P.V. ... the present value of a future sum

F.V. ... the future sum

i ... the interest rate as a decimal

n ... the number of years in the future

i.e. If $100 income is expected 5 years in the future, and the interest rate is 8.5% per annum, what is the present value of this future sum?

here P.V. is unknown

F.V. is $100

i is 0.085

n is 5

substituting,

$$P.V. = \frac{100}{(1 + 0.085)^5}$$

$$= \frac{100}{1.504} = \$66.49$$

In this example, $100 received 5 years in the future is worth $66.49 today, with interest rates at 8.5%. Or, if one invested $66.49 at this interest rate, it would be worth $100 in 5 years.

The net present value of the model discounted at a 15% interest rate is found to be in the order of $7.8 million. This means that a company would realize 15% on its investment and still have $7.8 million remaining at the end of the mine life. This remainder could be considered the present worth of this property given several similar opportunities paying 15% per annum.

The internal rate of return, discounted cash flow (I.R.O.R., D.C.F. method) is found by increasing the discount rate until the remainder is zero (cash inflow = cash outflow). This is found to be in excess of 35% for this particular study. Table 8 and Figure 7 summarize these calculations.

Figure A-1 illustrates the revenue distribution of the model with the price of gold set at $450 Cdn./ounce ($342 U.S.). The revenue pie does not illustrate the time value of the cash flow.

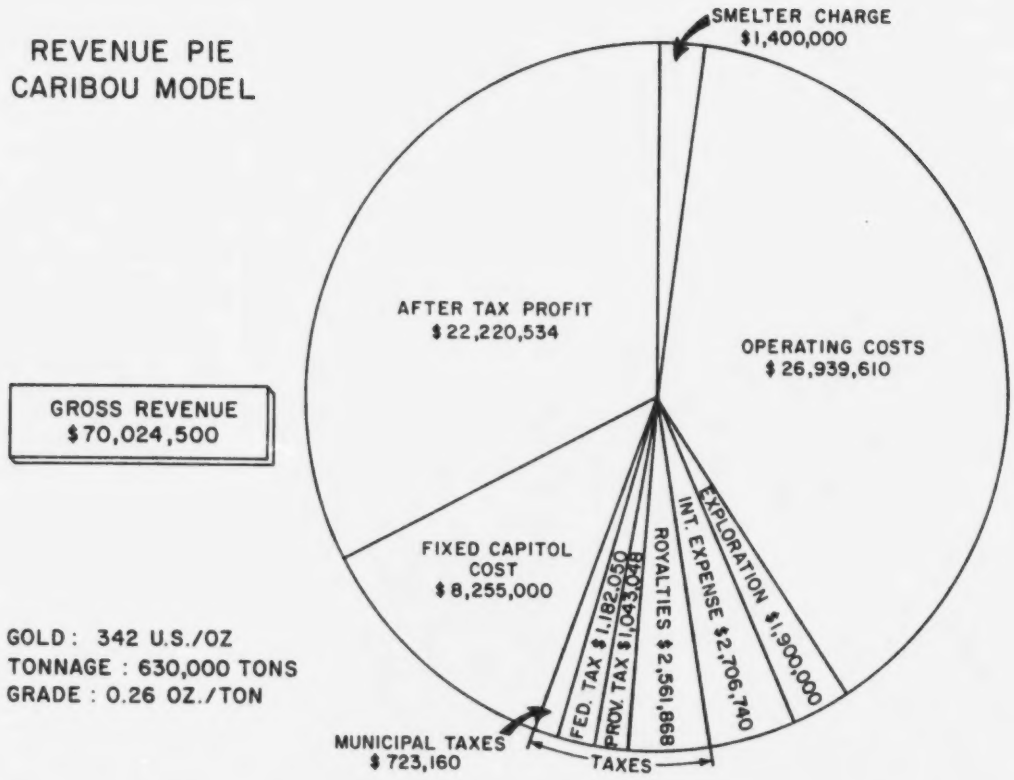
REVENUE PIE
CARIBOU MODEL
GROSS REVENUE
$70,024,500
GOLD : 342 U.S./OZ
TONNAGE : 630,000 TONS
GRADE : 0.26 OZ./TON
SMELTER CHARGE
$1,400,000
AFTER TAX PROFIT
$22,220,534
OPERATING COSTS
$26,939,610
FIXED CAPITOL
COST
$8,255,000
EXPLORATION $1,900,000
INT. EXPENSE $2,706,740
ROYALTIES $2,561,868
PROV. TAX $1,043,048
FED. TAX $1,182,050
MUNICIPAL TAXES
$723,160
TAXES

FIGURE A - 1

ASSAY OCCURRENCES FOR THE 500 FOOT LEVEL

Chip samples were taken at regular intervals on the 500 foot level of the Caribou Mine. The probability plot (Figure A-2) shows the cumulative frequency of grade occurrences over 0.05 ounces/ton, and Table 9 is a summary of these occurrences.

The probability plot of the assay values is constructed by plotting the cumulative frequency of the assays versus the natural log of the assay x 1000. This plot allows a very wide range of values to be handled. (706 assay values were used to construct Figure A-2, ranging from 0.06 ounces/ton to 52.17 ounces/ton)

Example: (assume 500 assays)

Assay	Assay x 1000	In (assay x 1000)	Frequency	% freq.	Cumulative Frequency %
0.06	60	4.09	100	20	20
0.10	100	4.61	50	10	30
0.20	200	5.30	40	8	38
0.30	300	5.70	35	7	45
0.40	400	5.99	30	6	51
0.50	500	6.21	25	5	56
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
3.00	3000	8.01	2	0.4	95.4
.	.	.	.	.	.
.	.	.	.	.	.
.	.	.	.	.	.
53.0	53000	10.88	1	0.2	99.9

PROBABILITY PLOT
CARIBOU 500 ft. level
Samples above 0.005 ounces/ton

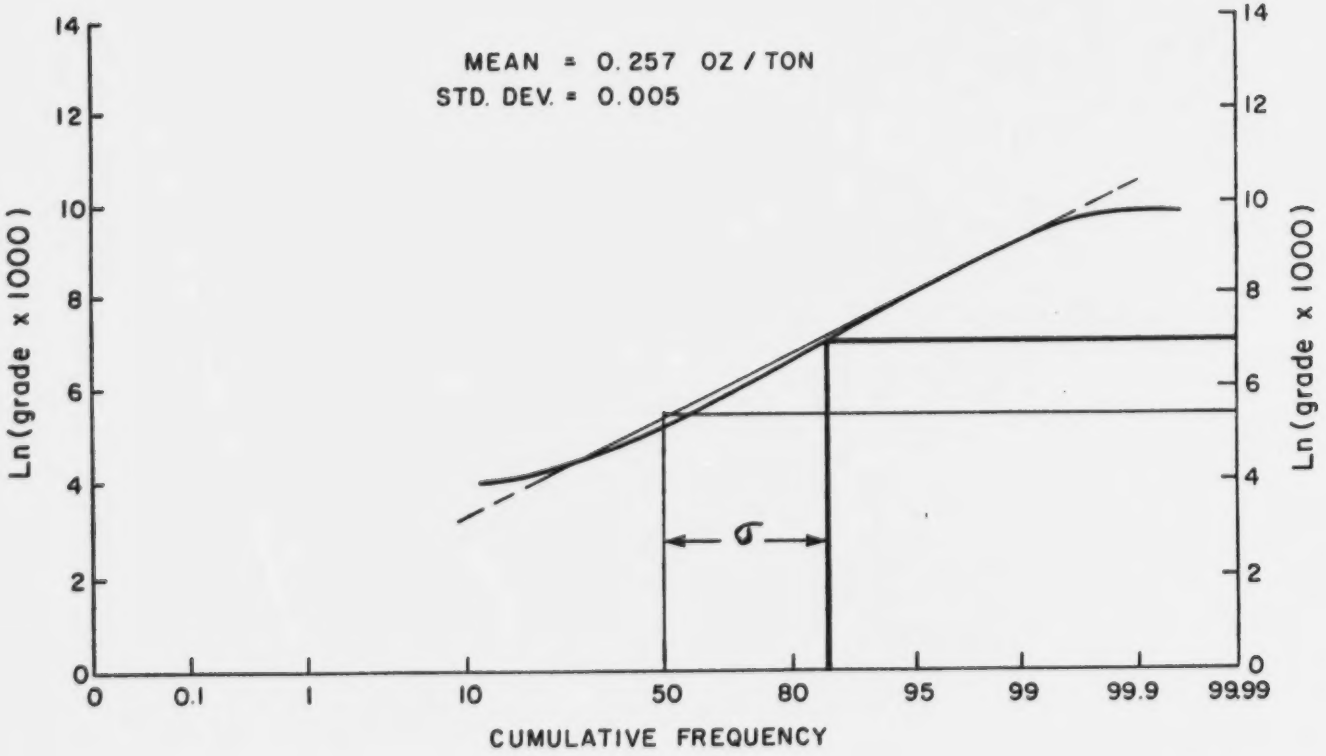

FIGURE A - 2

ASSAY OCCURRENCES FOR 500 FOOT LEVEL, CARIBOU MINE

(Troy Ounces Per Ton)

TABLE 9

Grade	No.	Grade	No.	Grade	No.	Grade	No.	Grade	No.	Grade	No.
0.01	408	0.66	2	1.32	3	1.98		2.64	1	3.30	
0.02	453	0.68	5	1.34	2	2.00		2.66		3.32	
0.04	203	0.70	2	1.36	2	2.02		2.68	1	3.34	
0.06	110	0.72	3	1.38	1	2.04	1	2.70	1	3.36	1
0.08	68	0.74	7	1.40		2.06		2.72		3.38	1
0.10	51	0.76	3	1.42	2	2.08		2.74		3.67	1
0.12	31	0.78		1.44	2	2.10		2.76		3.80	1
0.14	33	0.80	4	1.46	1	2.12		2.78		3.83	1
0.16	29	0.82	4	1.48		2.14	1	2.80		3.87	1
0.18	24	0.84	3	1.50	1	2.16	1	2.82		4.00	1
0.20	23	0.86	4	1.52	1	2.18		2.84		4.08	1
0.22	18	0.88	5	1.54		2.20		2.86		4.26	1
0.24	14	0.90	3	1.56	1	2.22		2.88		4.49	1
0.26	25	0.92	1	1.58		2.24		2.90		4.55	1
0.28	16	0.94	2	1.60	1	2.26	2	2.92		5.04	1
0.30	14	0.96	2	1.62	1	2.28		2.94		5.10	1
0.32	9	0.98	4	1.64	1	2.30	1	2.96		5.21	1
0.34	7	1.00		1.66		2.32		2.98		5.23	1
0.36	6	1.02	1	1.68		2.34		3.00		5.57	1
0.38	10	1.04	2	1.70		2.36		3.02		5.87	1
0.40	7	1.06	1	1.72		2.38		3.04		5.92	1
0.42	6	1.08	2	1.74		2.40		3.06		6.22	1
0.44	4	1.10	4	1.76		2.42		3.08	1	6.33	1
0.46	5	1.12	2	1.78	1	2.44		3.10		6.38	1
0.48	2	1.14	1	1.80	1	2.46		3.12	1	6.80	1
0.50	8	1.16	2	1.82	1	2.48	1	3.14		6.91	1
0.52	8	1.18		1.84		2.50	1	3.16		7.75	1
0.54	6	1.20	2	1.86	1	2.52	1	3.18		8.73	1
0.56	6	1.22	2	1.88	3	2.54		3.20		12.88	1
0.58	5	1.24	4	1.90	1	2.56	1	3.22		14.66	1
0.60	2	1.26		1.92		2.58	1	3.24	1	16.71	1
0.62	2	1.28		1.94		2.60		3.26		42.86	1
0.64	1	1.30	3	1.96		2.62	2	3.28		52.17	1
	1614		80		27		13		6		30

total samples = 1770

CARIBOU GOLD DISTRICT PRODUCTION FIGURES

Year	Ore Crushed		Gold Extracted		Yield	
	Tonnes	Tons	Grams	Troy Ounces	Grams/Tonne	T.Oz./Ton
1869	1,435.16	1,582.00	31,136.08	1,001.048	21.61	0.63
1870	684.92	755.00	19,083.60	613.552	27.77	0.81
1871	434.54	479.00	15,700.98	504.798	36.00	1.05
1872	333.84	368.00	6,523.96	209.750	19.54	0.57
1873	19.05	21.00	554.42	17.825	29.15	0.85
1874	302.09	333.00	11,463.13	368.548	38.05	1.11
1875	333.84	368.00	13,892.06	446.640	41.49	1.21
1876	491.69	542.00	22,308.07	717.221	45.26	1.32
1877	1,573.96	1,735.00	80,766.35	2,596.698	51.43	1.50
1878	842.77	929.00	31,931.86	1,026.63	38.05	1.11
1879	708.51	781.00	21,028.08	676.09	29.83	0.87
1880	747.52	824.00	25,607.18	823.29	34.28	1.00
1881	1,506.83	1,661.00	35,144.66	1,129.93	23.31	0.68
1882	1,452.40	1,601.00	18,298.89	588.32	12.29	0.37
1883	1,899.63	2,094.00	14,853.84	477.56	7.88	0.23
1884	1,414.29	1,559.00	30,076.94	966.99	21.25	0.62
1885	2,031.18	2,239.00	41,545.63	1,335.72	23.31	0.60
1886	2,800.46	3,087.00	69,481.54	2,233.88	24.68	0.72
1887	2,439.41	2,689.00	57,899.01	1,861.50	23.66	0.69
1888	5,727.03	6,313.00	84,896.95	2,729.50	14.74	0.43
1889	6,656.89	7,338.00	52,286.35	1,906.10	8.92	0.26
1890	6,042.73	6,661.00	49,049.54	1,576.98	8.22	0.24
1891	4,979.51	5,489.00	46,241.55	1,486.70	9.29	0.27
1892	6,521.72	7,189.00	72,651.51	2,335.80	11.14	0.32
1893	4,264.65	4,701.00	48,202.62	1,549.75	11.30	0.33
1894	8,824.14	9,727.00	86,461.46	2,779.80	9.80	0.29
1895	10,491.54	11,565.00	99,204.55	3,189.50	9.46	0.28
1896	12,626.13	13,918.00	89,099.03	2,864.60	7.06	0.21
1897	8,458.55	9,324.00	86,517.44	2,781.60	10.23	0.30
1898	5,613.63	6,188.00	37,369.28	1,201.45	6.66	0.19
1899	11,898.57	13,116.00	29,691.38	954.60	2.50	0.07
1900	7,573.14	8,348.00	50,804.43	1,633.40	6.71	0.20
1901	6,253.19	6,893.00	72,825.67	2,341.40	11.65	0.34
1902	8,972.01	9,890.00	67,248.84	2,162.10	7.50	0.22
1903	10,850.78	11,961.00	113,658.34	3,654.20	10.47	0.31

Year	Ore Crushed		Gold Extracted		Yield	
	Tonnes	Tons	Grams	Troy Ounces	Grams/Tonne	T.Oz./Ton
1904	9,608.85	10,592.00	57,756.05	1,856.90	6.01	0.18
1905	12,698.71	13,998.00	41,028.60	1,319.10	3.23	0.09
1906	8,407.74	9,268.00	25,850.10	831.10	3.07	0.09
1907	4,044.21	4,458.00	19,858.02	638.45	4.91	0.14
1908	1,124.90	1,240.00	4,105.66	132.00	3.65	0.11
1909	957.07	1,055.00	8,842.72	284.30	9.24	0.27
1910	371.04	404.00	8,413.49	270.50	22.68	0.66
1911	684.01	754.00	26,445.33	850.23	38.66	1.13
1912	1,240.12	1,367.00	30,627.60	984.70	24.70	0.72
1913	623.23	687.00	14,285.05	459.24	22.92	0.67
1914	716.67	790.00	15,038.66	483.50	20.98	0.61
1915	292.11	322.00	9,141.31	293.90	31.29	0.91
1916	373.76	412.00	21,579.41	693.79	57.74	1.68
1917	331.12	365.00	6,229.78	200.29	18.81	0.53
1918	544.31	600.00	8,740.08	281.00	16.06	0.47
1919	937.12	1,033.00	12,307.65	395.70	13.13	0.38
1920	312.98	345.00	6,415.47	206.26	20.50	0.60
1921	36.29	40.00	2,309.18	74.24	63.63	1.86
1922	4.54	5.00	229.26	7.37	50.50	1.47
1923	--	--	--	--	--	--
1924	13.61	15.00	2,146.14	69.00	157.59	4.60
1925	4.54	5.00	142.49	4.58	31.39	0.92
1926	--	--	--	--	--	--
1927	--	--	--	--	--	--
1928	--	--	--	--	--	--
1929	--	--	--	--	--	--
1930	--	--	--	--	--	--
1931	--	--	--	--	--	--
1932	--	--	--	--	--	--
1933	268.53	296.00	5,559.75	178.75	20.70	0.60
1934	760.22	838.00	9,486.69	305.00	12.48	0.36
1935	1,533.13	1,690.00	16,432.56	528.32	10.72	0.31
1936	247.48	272.80	3,222.07	103.59	13.02	0.38
1937	672.13	740.90	12,357.66	397.31	18.39	0.54
1938	7,525.24	8,295.20	121,800.33	3,915.971	16.19	0.47
1939	9,674.89	10,664.80	189,100.83	6,079.73	19.55	0.57
1940	11,779.37	12,984.60	199,513.25	6,414.49	10.94	0.49

Year	Ore Crushed		Gold Extracted		Yield	
	Tonnes	Tons	Grams	Troy Ounces	Grams/Tonne	T.Oz./Ton
1941	10,737.75	11,836.40	207,931.06	6,685.14	19.36	0.56
1942	9,393.49	10,354.60	198,885.80	6,394.33	21.17	0.62
1943	8,172.78	9,009.00	109,899.83	3,533.36	13.45	0.39
1944	7,440.69	8,202.00	131,912.57	4,241.09	17.73	0.52
1945	6,671.40	7,354.00	60,522.96	1,945.86	9.07	0.26
1946	6,895.48	7,601.00	103,612.20	3,331.21	15.03	0.44
1947	1,509.55	1,664.00	26,245.52	843.81	17.39	0.51
					Average Yield	AverageYield
TOTALS	273,815.32	301,831.30	3,358,481.13	107,977.66	12.27	0.36
	Tonnes	Tons	Grams	T. Ounces	Grams/Tonne	T.Oz./Ton